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10/092,305	03/07/2002	Toshihiro Ohtani	1344.1086	2699

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EXAMINER	
WANG, QUAN ZHEN	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/092,305	OHTANI, TOSHIHIRO	
	Examiner	Art Unit	
	Quan-Zhen Wang	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The newly added limitation to claims 1 and 3 "the insertion loss of the optical parts id added to said threshold value" was not supported by the specification as it was originally filed. Therefore, the newly added limitation is considered as new matter.

The newly added limitation to claims 17, 19, 20, and 22 "insertion loss of optical parts arranged between an optical amplifying section and an input end of the SRS generating medium is added to the threshold value" was not supported by the specification as it was originally filed. Therefore, the newly added limitation is considered as new matter.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 8-11, 14, 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura (JP07-199244 A) in view of Chraplyvy et al. (U.S. Patent US 6,580,536 B1).

Regarding claims 1, 3, 17, 19, 20, and 22, as they are understood in view of the above 112 problems, Okamura teaches a noise light elimination apparatus (fig. 2, Section 20), comprising: a stimulated Brillouin scattering generating medium (fig. 2, Fiber Cable 6) that generates a return light due to stimulated Brillouin scattering when a light having a power exceeding a threshold value is applied to the stimulated Brillouin scattering generation medium (paragraph 0018); an optical amplifying section (fig. 2, Amplifier 4) that amplifies a signal light up to a power exceeding the threshold value; and an optical input/output section (fig. 2, Branching Section 5) that applies the signal light amplified by the optical amplifying section to the stimulated Brillouin scattering generating medium, and extracts ("separate at the branching section 5", paragraph 0019) the return light generated by the stimulated Brillouin scattering generating medium as the amplified signal light (paragraph 0019), to thereby eliminate the noise light components contained in the signal light. Okamura further teaches that the optical fiber generating Brillouin scattering is variably set (paragraph 0009), which inherently sets the threshold value of Brillouin scattering variably; and the output light power of the optical amplifying section is set based on the threshold value and the threshold value inherently includes the insertion loss of the optical components (paragraphs 0009 and

0018: "The scattering optical fiber cable 6 has the length sufficient for a major part of a stimulated Brillouin scattering light due to optical energy, ..."). Okamura differs from the claimed invention in that Okamura does not specifically teach that the power of noise light components in the amplified signal lights is smaller that the threshold value of the stimulated Brillouin scatting. However, Okamura further pointed out that the threshold for stimulates Brillouin scatting is about 10 dBm (column 5, lines 24-33), which is higher than the noise level of an optical signal propagating in optical fiber. In addition, it is well known in the art that the power of noise light components in an amplified signal light is smaller than the power of signal light components in the same amplified signal light. For example, Chraplyvy discloses that the power of noise light components (fig. 3, 301) in an amplified signal light is smaller than the power of signal light components in the amplified signal light (fig. 3, 305, 307, and 308). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to configure the system of Okamura such that the power of noise light components in an amplified signal lights smaller than the threshold value of the stimulated Brillouin scatting, and the power of the signal light components in the amplified signal lights higher than the threshold value of the stimulated Brillouin scatting in order to provide an optical amplifier system with high gain and low noise.

Regarding claims 2, 4, and 5, Okamura teaches that the apparatus further comprising an adjusting section (fig. 2, Amplifier 7) that adjusts a power of the return light generated by the stimulated Brillouin scattering generation medium, and the

adjusting section includes an optical amplifier (fig. 2, Amplifier 7) that amplified the return light (paragraph 0019).

Regarding claims 8-10, Okamura further teaches that the stimulated Brillouin scattering generating medium is provided in a form of an optical transmission path, optical fiber, and optical waveguide (fig. 2, Fiber Cable 6; paragraph 0018).

Regarding claim 11, Okamura further teaches that the other end of the stimulated Brillouin scattering generating medium positioned on an opposite side to one end to which the signal light amplified by the optical amplifying section is input, is subjected to non-reflection termination treatment (paragraph 0021).

Regarding claim 14, Okamura teaches an optical transmission system (fig. 2) for amplifying a signal light sent from an optical transmission device (fig. 2, station 1) to an optical transmission path, by optical repeaters (fig. 2, Amplifiers 11 and 12) arranged on the optical transmission path, to repeating transmit the signal light to an optical receiving device (fig. 2, station 10), comprising; at least one of the noise light elimination apparatus (fig. 2, Compensation Device 21) recited in claim 3 on the optical transmission path (fig. 2, the optical transmission path from transmitter 1 to receiver 10).

Regarding claims18 and 21, Okamura further teaches to extract return light to a transmission line as the amplified signal light (fig.2, combination of element 5, 7, and 8).

5. Claims 6-7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura (JP07-199244 A) in view of Chraplyvy et al. (U.S. Patent US 6,580,536 B1) and further in view of Sugaya et al. (U.S. Patent Application Publication US 2001/0017729 A1).

Regarding claim 6, Okamura and Chraplyvy have been discussed above in regard to claims 3 and 4. Okamura and Chraplyvy differ from the claimed invention in that Okamura and Chraplyvy do not specifically teach that the adjusting section includes an optical attenuator that attenuates the return light. However, it is well known in the art that an optical attenuator is widely used to attenuate optical signals to a desired level. For example, Sugaya discloses an optical attenuator (fig. 3, Attenuator 64) to attenuate optical signals to a desired level (paragraph 0068). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use an optical attenuator, such as the one disclosed by Sugaya, in the modified apparatus of Okamura and Chraplyvy in order to adjust the return light to a desired level.

Regarding claim 7, Okamura and Chraplyvy have been discussed above in regard to claims 3 and 4. Okamura and Chraplyvy differ from the claimed invention in that Okamura and Chraplyvy do not specifically teach that the apparatus further comprising a detection section that detects a power of the return light output from the adjusting section; and a control section that controls an operation of the adjusting section based on a detection result of the detection section. However, it is well known in the art to detect a power level of an optical signal and control an operation based on the detection result. For example, Sugaya teaches an optical adjusting apparatus (fig. 3, Part 1000) which detects the power level of the optical signal (fig. 3, splitter 54 and PD 58) and control an operation (the optical amplification) (fig. 3, Automatic Gain Control Circuit 60) based on the detection result. Therefore, it would have been obvious

for one of ordinary skill in the art at the time when the invention was made to incorporate an optical adjusting apparatus which detects the power level of the optical signal and control an operation based on the detection result, such as the one taught by Sugaya, in the modified apparatus of Okamura and Chraplyvy in order to adjust the signal level of the return light to a desired level.

Regarding claim 12, Okamura and Chraplyvy have been discussed above in regard to claims 1 and 3. Okamura further teaches that the noise light elimination apparatus further comprises an optical coupler having three ports (fig. 2, branching section 5; paragraph 0019), and the signal light amplified by the optical amplifier is input to a first port of the optical coupler and output from a second port of the optical coupler to the stimulated Brillouin scattering generation medium, and the return light generated by the stimulated Brillouin scattering generation medium is input to the second port of the optical coupler (fig. 2, branching section 5) and branched into two (fig. 2, first port: from 5 to 4, and third port: from 5 to 7) to be output from the first port and a third port. Okamura and Chraplyvy differ from the claimed invention in that Okamura and Chraplyvy do not specifically teach an optical isolator to block the return light output from the first port of the optical coupler to the optical amplifying section. However, it is well known in the art to use an isolator to block optical signals from traveling backwards. For example, Sugaya teaches to use optical isolator (fig. 3, Isolator 55) to block backward traveling light along the optical fiber. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use an isolator, as it is taught by Sugaya, in the modified apparatus of Okamura and Chraplyvy

in order to block the return light generated by stimulated Brillouin scattering back to the signal amplifier.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura (JP07-199244 A) in view of Chraplyvy et al. (U.S. Patent US 6,580,536 B1) and further in view of Johnson et al. (U.S. Patent Application Publication US 2002/0131104 A1).

Regarding claim 13, Okamura and Chraplyvy have been discussed above in regard to claims 3 and 4. Okamura and Chraplyvy differ from the claimed invention in that Okamura and Chraplyvy do not specifically teach that the optical input/output section includes an optical circulator arranged between an optical output end of the optical amplifying section and an optical input end of the stimulated Brillouin scattering generating medium. However, it is well known in the art to use an optical circulator to replace a 3-port coupler for certain applications. For example, Johnson teaches to use optical circulator to replace 1X2 couplers 44 and 46 in Fig. 4 (paragraph 0057). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use an optical circulator, as it is taught by Johnson, in the apparatus of Okamura and Chraplyvy in order to reduce effects of reflections back to the optical signal amplifier.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura (JP07-199244 A) in view of Chraplyvy et al. (U.S. Patent US 6,580,536 B1) and further in view of Kai et al. (U.S. Patent US 6,462,844 B1).

Regarding claim 15, Okamura and Chraplyvy have been discussed above in regard to claims 1, 3, and 14. Okamura and Chraplyvy differ from the claimed invention in that O Okamura and Chraplyvy do not specifically teach that the optical receiving device includes a demultiplexer that demultiplexes the signal light transmitted on the optical transmission path, in accordance with a wavelength thereof, and the demultiplexer has filter characteristics where a center wavelength of a transmission band is set in accordance with a wavelength shift amount due to stimulated Brillouin scattering occurring in the noise light elimination apparatus. However, it is well known in the art to use a demultiplexer having filter characteristics with a center wavelength of transmission band is set in accordance with the signals to demultiplex optical signals at a receiving device. For example, Kai teaches an optical receiving device (fig. 1, optical receiving apparatus 3) which includes a demultiplexer (fig 1, CPL 31 and AOTF 32-1 to 32-n) that demultiplexes the signal light transmitted on the optical transmission path, and the demultiplexer has filter characteristics (fig. 1, AOTF 32-1 to 32-n) where a center wavelength of a transmission band can be set in accordance with the signal wavelength (column 11, lines 5-15). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use an optical receiving device which includes a demultiplexer, such as the one taught by Kai, to

replace the receiving device of Okamura and Chraplyvy in order to receive signals at multiple wavelengths.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura (JP07-199244 A) in view of Chraplyvy et al. (U.S. Patent US 6,580,536 B1) and Kai et al. (U.S. Patent US 6,462,844 B1) and further in view of Uetsuka et al. (U.S. Patent US 6,549,696 B1).

Regarding claim 16, the modified system by Okamura, Chraplyvy, and Kai differs from the claimed invention in that Okamura, Chraplyvy, and Kai do not specifically teach that the demultiplexer includes an arrayed wave guide grating capable of adjusting the filter characteristics. However, it is well known in the art that an arrayed wave guide grating can be used for demultiplexer and is capable of adjusting the filter characteristics. For example, Uetsuka teaches an AWG type optical demultiplexer (figs. 10, 13, and 14) which inherently having filter characteristics and the center wavelength can be accurately set (column 19, lines 22-32). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply an arrayed wave guide grating based demultiplexer, such as the one taught by Uetsuka, for the demultiplexer in the modified apparatus of Okamura, Chraplyvy, and Kai in order to reduce the insertion loss of the demultiplexer and the channel cross-talk at the receiver.

Response to Arguments

9. Applicant's arguments filed March 28, 2006 have been fully considered but they are not persuasive.

Regarding claims 1, 3, 17, 19, 20, and 22, Applicant argues that "Okamura discloses a configuration for compensating for optical waveform degradation not only by generating a phase conjugate wave but by propagating the phase conjugate wave in the optical fiber cable 9 by the length that is to compensate for the waveform having been degraded by the optical fiber cable 2 (see paragraph (0002) of page 8 of the English translation of Okamura previously submitted by the Applicant)." However, the optical waveform degradation generated due to wavelength dispersion or an optical nonlinearity during signal light propagation in each of the optical fiber cable 2 and 9 is offset at both of the input and output sides in Okamura does not affect the obviousness rejection under U.S.C. 103 of the claimed invention over Okamura and Chraplyvy. Firstly, although the intention of Okamura is to compensate of the waveform degradation generated due to wavelength dispersion of an optical nonlinearity during signal light propagation, the method to generate signal light using stimulated Brillouin scattering in Okamura is the same as the method in claimed invention. The signal generated by stimulated Brillouin scattering is naturally phase conjugated. If the scattering unit is placed at the mid-point of a transmission line, the optical waveform degradation generated due to wavelength dispersion or an optical nonlinearity during signal light propagation in the transmission line will be naturally compensated. In other words, whether the optical waveform degradation generated due to wavelength dispersion or an optical nonlinearity during signal light propagation in a transmission line

is compensated or not just depends on where the scattering unit is placed. Secondly, the claimed invention does not mention anything as to the location of the stimulated Brillouin scattering apparatus in the optical network. Therefore, the claimed invention in claim 1 is unpatentable over Okamura in view of Chraplyvy under U.S.C. 103.

The Applicant argues that "Okamura discloses that a signal intensity of 10dBm or above is necessary for generating the stimulated Brillouin scattering (see paragraph (0003) of page 8 in the English translation of Okamura previously submitted by the Applicant). That is, Okamura fails to disclose varying this value according to surrounding conditions of the scattering optical fiber cable 6 such as insertion loss of the branching section 5 as shown in FIG. 1 of Okamura." Examiner respectfully disagrees with Applicant since Okamura clearly discloses that the optical fiber generating Brillouin scattering is variably set (paragraph 0009) and "the scattering optical fiber cable 6 has the length sufficient for a major part of a stimulated Brillouin scattering light due to optical energy, ..." (paragraph 0018). Because the components used in the system of Okamura inherently have insertion losses, the threshold value of Okamura must be varying according to surrounding conditions of the scattering optical fiber cable 6 in order to generate stimulated Brillouin scattering due to optical energy of the signals.

The Applicant further argues the motivation to combine Okamura and Chraplyvy since "Chraplyvy is not related to 'noise light elimination'". However, both Okamura and Chraplyvy belong to the same art of optical communications and Chraplyvy is cited to simply show that the power of noise light components is smaller than the power of signal light components, it would have been obvious for one of ordinary skill in the art at

the time when the invention was made to configure the system of Okamura such that the power of noise light components in an amplified signal lights smaller than the power of signal light components, as it is disclosed by Chraplyvy. Furthermore, Okamura discloses a configuration for compensating for optical waveform degradation of optical signals, therefore, it would be obvious for one of ordinary skill in the art to configure the system such that only optical signal components will be scattered by SBS process in the scattering cable 6.

In conclusion, for the reasons presented above the rejections of claims 1, 3, 17, 20, and 22 still stand. For the same reasons presented above, the rejections of other standing claims also stand.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw
4/3/2006

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